GE
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Programmable Control Products

VersaMax Serial to Ethernet Adapter

User's Manual

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	support.jp.ip@ge.com (Japan)
	support.in.ip@ge.com (remaining Asia customers)
Customer Care Email	customercare.apo.ip@ge.com
	customercare.cn.ip@ge.com (China)

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Chapter 3.	**Network Protocols:** IP address, packing algorithm, and port number.
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Related Publications

GFK-1645 *VersaMax Micro PLCs and Nano PLCs User's Manual*

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Chapter 1

Introduction and Quick Start

Introduction

The VersaMax™ IC200SET001 Serial to Ethernet Adapter (VMSE) brings network connectivity to factory floors. It is designed to connect industrial devices with serial interfaces to an Ethernet network using the TCP protocol family (TCP for transparent stream- and UDP for datagram applications). Various devices can be interfaced, for example:

- PLCs
- CNC Controllers
- Terminals
- Time/attendance and data collection devices
- Industrial robots
- Data display units
- Instruments

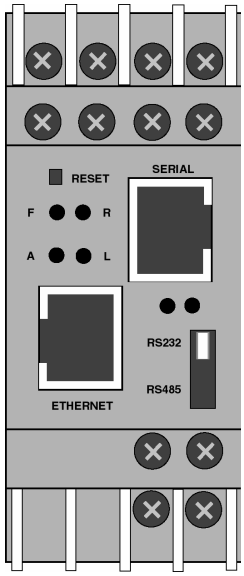

Figure 1-1. IC200SET001 VMSE

1

VMSE Firmware Options

The IC200SET001 VMSE has multiple firmware choices. All of the choices are shipped on the CD that is shipped with the VMSE unit. Upgrades and new firmware choices will be placed on the GE WEB site, as they become available.

The VMSE ships with the default SRTP/SNP firmware loaded in flash memory.

SRTP/SNP Firmware

The SRTP/SNP firmware is used to connect GEPLCs, or other devices, that support the SNP protocol, to Ethernet.

Devices that support Ethernet (VersaPro™ CIMPLICITY™HMI, Series 90-30™, Series 90-70™, and 3rd party devices) can communicate with PLCs with a serial SNP port by using the VMSE with the SRTP/SNP firmware. This firmware handles the conversion from Ethernet (SRTP) to SNP and also handles the timing requirements of SNP.

Note: The VMSE can not handle multidropped SNP devices if the communications are originating from a device using SRTP. To multidrop SNP Slaves off a VMSE, another VMSE is required at the Master end, and the Master needs to send messages via SNP not SRTP.

Pass Thru Firmware

Pass Thru firmware is used to connect other serial protocols to Ethernet. Typically this firmware is used to send serial communication and use Ethernet to replace serial cables by using two VMSE units, one at each end. Pass Thru Firmware can also be used with a PC software package that communicates Ethernet to a VMSE unit, which, in turn, converts the Ethernet messages to a serial message to communicate to the end device.

Some examples of using Pass Thru firmware are:

- Logicmaster™ 6 to Series Six™ CCM Type 2 card
- PC Application to a CNC

Modbus™ TCP/RTU firmware

Modbus TCP/RTU firmware is used to communicate between devices that use Modbus TCP and devices that use Modbus RTU serial protocol.

Quick Start

The easiest way to configure the IC200SET001 VMSE is over Ethernet. The steps in the following procedure need to be done in the order listed to configure the VMSE.

Preliminary Step

Connect the VSME to the Ethernet network.

Default IP Address

The VMSE is shipped with a default IP address of 0.0.0.0, which automatically enables the DHCP within the VMSE.

NOTE: Using the ARP (Address Resolution Protocol) command (see below) you can always override the IP address given to the VMSE by your DHCP server.

Procedure: Assigning a New IP Address

Use the following steps to assign an IP address over the network. All of the following are done from the MS-DOS® prompt of your personal computer. The actual numbers and letters you must type are shown in bold type. This data is not case-sensitive. You can access the MS-DOS prompt from your computer's Start/Programs submenu. For ease of reading on the printed page, many of the screen images shown in the figures in this manual have been converted from their normal white letters on a black background to black letters on a white background.

In the example shown in this section, the IP Address 3.16.27.44 will be assigned to the VMSE.

The MAC address of the VMSE is required for assigning an IP address. Use the MAC address that is printed on the side of your VMSE, which is of the format 00-20-xx-xx-xx-xx. For this example, the MAC address 00-20-4A-51-0E-5B will be used.

A. Type **ping (any valid IP address on your network)** at the MS-DOS prompt, and then press the **Enter** key. (This step is required to "establish" the ARP table by creating an entry in the table.) The address pinged should reply as shown in the example in the next figure. In this example, the command and valid IP address was typed as follows:

ping 3.16.16.14

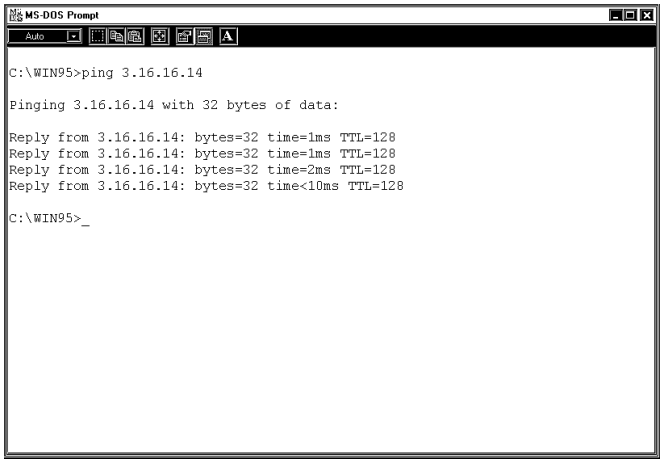
MS-DOS Prompt
Auto
C:\WIN95>ping 3.16.16.14
Pinging 3.16.16.14 with 32 bytes of data:
Reply from 3.16.16.14: bytes=32 time=1ms TTL=128
Reply from 3.16.16.14: bytes=32 time=1ms TTL=128
Reply from 3.16.16.14: bytes=32 time=2ms TTL=128
Reply from 3.16.16.14: bytes=32 time<10ms TTL=128
C:\WIN95>_

Figure 1-2. Results of the Ping Command

B. Type **arp -a** (make sure you leave a space between arp and –a) at the MS-DOS prompt, then press the Enter key. You should see at least one entry in the ARP table, as shown in the next figure:

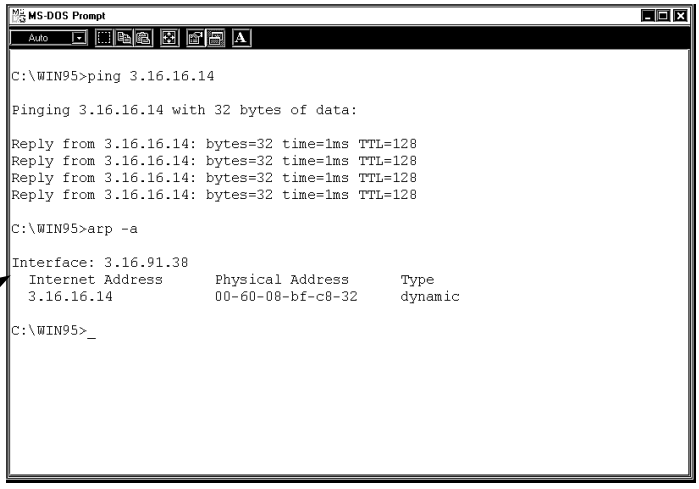

Figure 1-3. Results of the arp –a Command

If the response is "No arp entries found," repeat steps A. and B. to ping other devices until the **arp -a** command lists one or more devices**. Note that dynamic ARP table entries such as the one created above will be removed from the arp table automatically after several minutes, so if you do not complete this procedure and have to come back to it at a later time, you may have to start from the beginning. Static entries which are created manually, will not be removed automatically.**

C. Type the following at the prompt, then press the Enter key:

arp –s (IPAddress you want the VMSE to have) (Mac Address of VMSE)

This example uses: arp -s 3.16.27.44 00-20-4a-51-0e-5b

NOTE: You will not see any reply on the screen (see Figure 1-5).

D. Type **telnet (IP Address) 1** (don't forget the space between the IP address and the 1), and then press the Enter key.

This example uses: Telnet 3.16.27.44 1

This connection will fail, but the VMSE will change its IP address to the one designated in the ARP command line. You should see the following screen after a short time-out period:

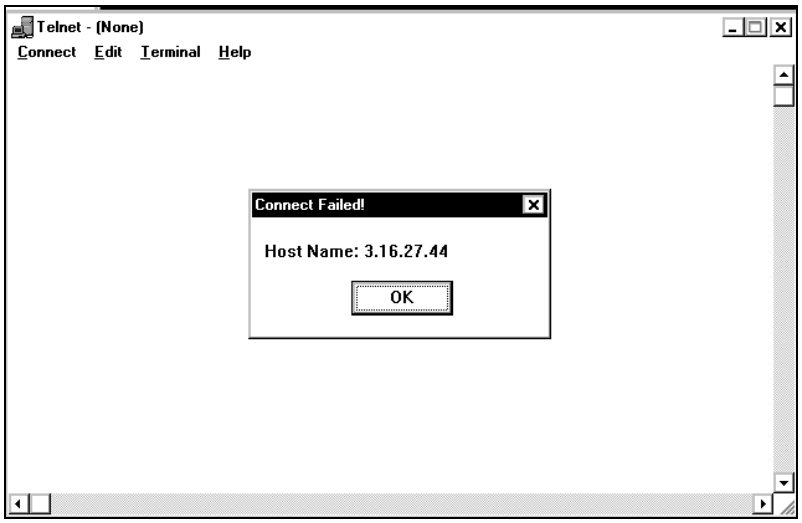

Figure 1-4. Results of the Telnet 3.16.27.44 1 Command

E. Click the OK button in the "Connect Failed" box, then close the "Telnet (None)" box.

F. At the MS-DOS prompt, type **Telnet (IP Address) 9999** (don't forget the space between the IP address and 9999), and then press the Enter key

This example uses: telnet 3.16.27.44 9999

The following figure shows the screen before the Enter button is pressed:

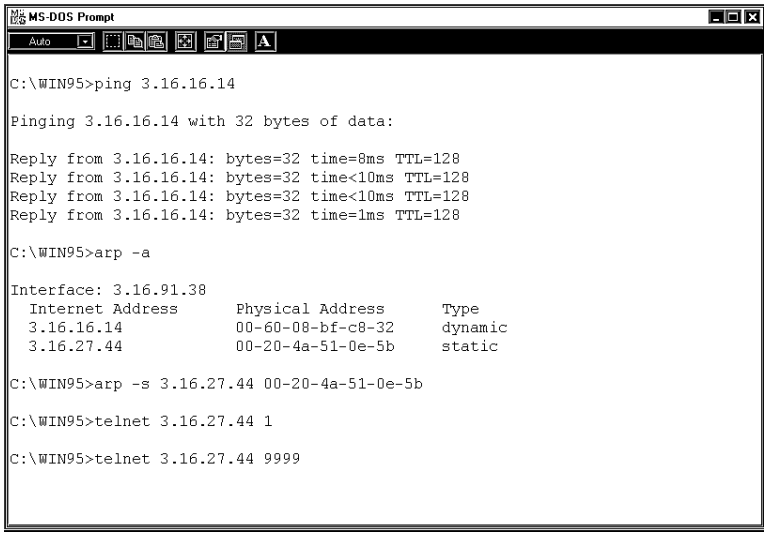

Figure 1-5. Screen Appearance Just Before Step G.

G. After the Enter button is pressed in the previous step, the Telnet window opens with the VMSE Serial number, shown in the next figure. Confirm the Telnet connection by pressing the Enter key within 3 seconds. It you don't respond by pressing the Enter key within 3 seconds, the telnet connection will time out and you will have to close the telnet window and repeat the previous step.

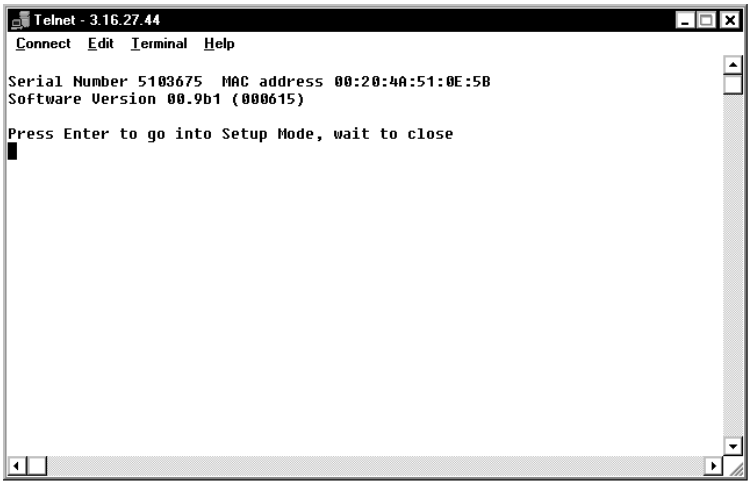
Telnet - 3.16.27.44
Connect Edit Terminal Help
Serial Number 5103675 MAC address 00:20:4A:51:0E:5B
Software Version 00.9b1 (000615)
Press Enter to go into Setup Mode, wait to close

Figure 1-6. The Telnet Response Window

Once you press the Enter key, the following VMSE Configuration screen will appear:

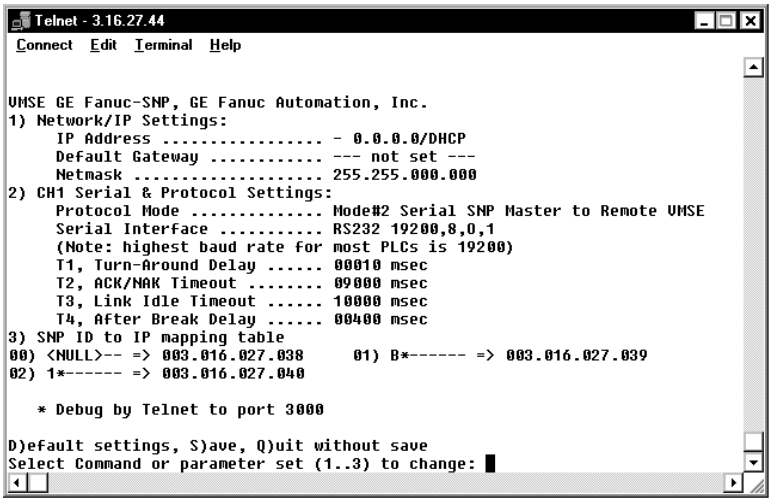
Telnet - 3.16.27.44
Connect Edit Terminal Help
VMSE GE Fanuc-SNP, GE Fanuc Automation, Inc.
1) Network/IP Settings:
IP Address ..... - 0.0.0.0/DHCP
Default Gateway ..... --- not set ---
Netmask 255.255.000.000
2) CH1 Serial & Protocol Settings:
Protocol Mode ..... Mode#2 Serial SNP Master to Remote VMSE
Serial Interface RS232 19200,8,0,1
(Note: highest baud rate for most PLCs is 19200)
T1, Turn-Around Delay ..... 00010 msec
T2, ACK/NAK Timeout ..... 09000 msec
T3, Link Idle Timeout ..... 10000 msec
T4, After Break Delay ..... 00400 msec
3) SNP ID to IP mapping table
00) <NULL>-- => 003.016.027.038 01) B*------ => 003.016.027.039
02) 1*------ => 003.016.027.040
* Debug by Telnet to port 3000
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..3) to change:

Figure 1-7. The VMSE Configuration Screen

H. Type **s** to save the IP address in the VMSE. (It is not necessary to press the Enter key.) The "Connection to host lost" Telnet dialog box will appear (this is normal) shown in the next figure:

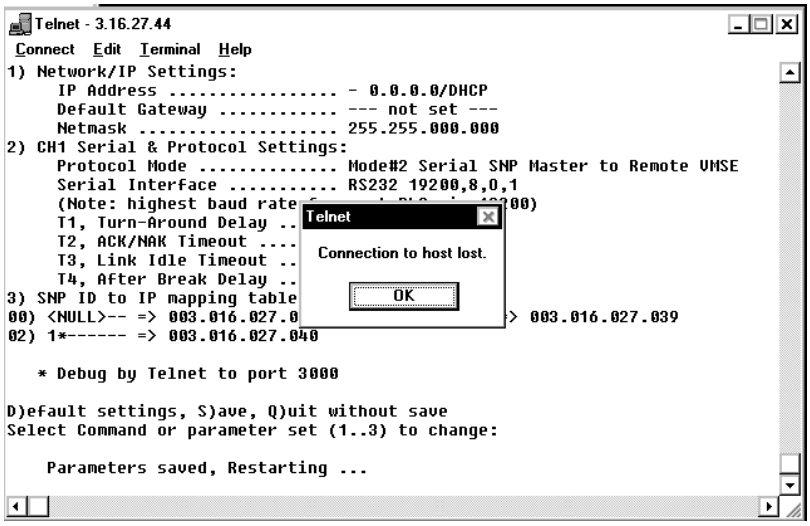
Telnet - 3.16.27.44
Connect Edit Terminal Help
1) Network/IP Settings:
IP Address ..... - 0.0.0.0/DHCP
Default Gateway ..... --- not set ---
Netmask 255.255.000.000
2) CH1 Serial & Protocol Settings:
Protocol Mode ..... Mode#2 Serial SNP Master to Remote VMSE
Serial Interface RS232 19200,8,0,1
Telnet
Connection to host lost.
OK
3) SNP ID to IP mapping table
02) 1*------ => 003.016.027.040
* Debug by Telnet to port 3000
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..3) to change:
Parameters saved, Restarting ...

Figure 1-8. The "Connection to host lost" Telnet Box

I. Click the OK button in the "Connection to host lost" Telnet dialog box to close it, and then close the Telnet box.

J. Reconnect by typing **telnet 191.12.3.77 9999** at the MS-DOS prompt, and then pressing the Enter key. This will take you to the VMSE Configuration screen, shown in Figure 1-7.

K. Use this screen to configure the VMSE. An example is provided in the following "Configuration" section.

Note

The VMSE comes equipped with SNP/SRTP firmware by default. If you are using a protocol other than SNP/SRTP, you must load the correct firmware for your protocol from the supplied CD (see Chapter 5 for firmware upgrade details) before proceeding with configuration. Note that changing the firmware will not change the IP address set in the previous steps.

Configuration

This section is just an overview. See Chapter 4 for configuration details.

Before proceeding with the configuration procedure, ensure that you have the correct firmware loaded in the VMSE. The VMSE comes equipped with SNP/SRTP by default. If you are using a different protocol, you must load the correct firmware for that protocol. See Chapter 5 for instructions.

You have six Command choices at the Configuration screen Command Prompt (see next figure). You do not have to press the Enter key after typing a command number or letter.

- 1 – to configure Network/IP Settings
- 2 – to configure CH1 Serial and Protocol Settings
- 3 – to configure SNP ID to IP Mapping Table
- d – to revert to default settings
- s – to save your changes and quit
- q – to quit without saving your changes

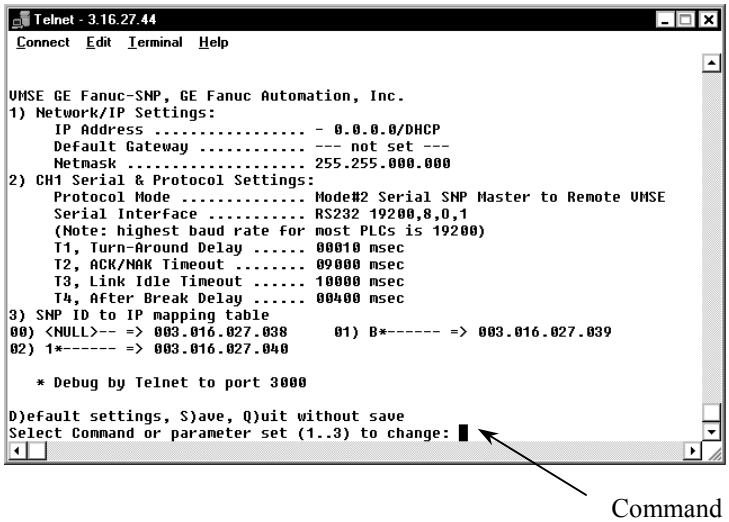
Telnet - 3.16.27.44
Connect Edit Terminal Help
VMSE GE Fanuc-SNP, GE Fanuc Automation, Inc.
1) Network/IP Settings:
IP Address ..... - 0.0.0.0/DHCP
Default Gateway ..... --- not set ---
Netmask 255.255.000.000
2) CH1 Serial & Protocol Settings:
Protocol Mode ..... Mode#2 Serial SNP Master to Remote VMSE
Serial Interface RS232 19200,8,0,1
(Note: highest baud rate for most PLCs is 19200)
T1, Turn-Around Delay ..... 00010 msec
T2, ACK/NAK Timeout ..... 09000 msec
T3, Link Idle Timeout ..... 10000 msec
T4, After Break Delay ..... 00400 msec
3) SNP ID to IP mapping table
00) <NULL>-- => 003.016.027.038
01) B*------ => 003.016.027.039
02) 1*------ => 003.016.027.040
* Debug by Telnet to port 3000
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..3) to change:
Command Prompt

Figure 1-9. VMSE Configuration Screen

Configuration Example

The following figure shows the results of pressing the 2 key to select the "CH1 Serial and Protocol Settings" parameter group.

Notice that the first parameter in the group ("Protocol Mode") is displayed. The current value is shown in parentheses (001 in this example) before the prompt. Simply pressing the Enter key would retain the current parameter value; typing 2 and pressing the Enter key would set the Protocol Mode parameter to Mode #2.

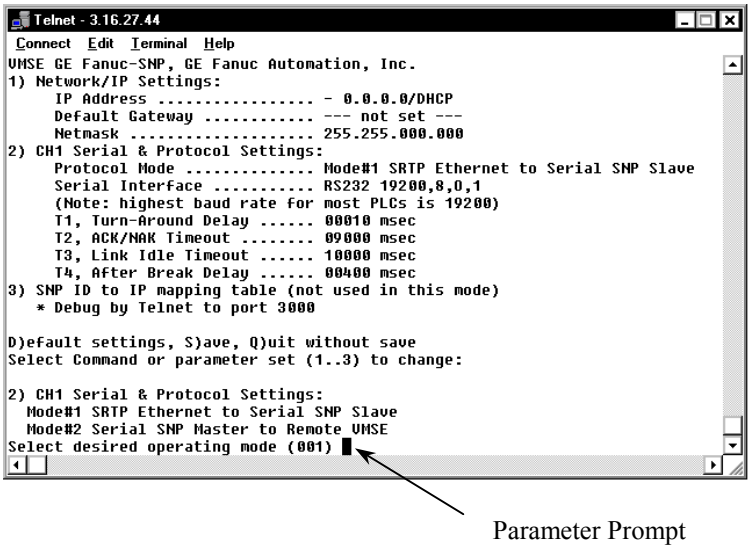
Telnet - 3.16.27.44
Connect Edit Terminal Help
VMSE GE Fanuc-SNP, GE Fanuc Automation, Inc.
1) Network/IP Settings:
IP Address ..... - 0.0.0.0/DHCP
Default Gateway ..... --- not set ---
Netmask 255.255.000.000
2) CH1 Serial & Protocol Settings:
Protocol Mode ..... Mode#1 SRTP Ethernet to Serial SNP Slave
Serial Interface RS232 19200,8,0,1
(Note: highest baud rate for most PLCs is 19200)
T1, Turn-Around Delay ..... 00010 msec
T2, ACK/NAK Timeout ..... 09000 msec
T3, Link Idle Timeout ..... 10000 msec
T4, After Break Delay ..... 00400 msec
3) SNP ID to IP mapping table (not used in this mode)
* Debug by Telnet to port 3000
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..3) to change:
2) CH1 Serial & Protocol Settings:
Mode#1 SRTP Ethernet to Serial SNP Slave
Mode#2 Serial SNP Master to Remote VMSE
Select desired operating mode (001)
Parameter Prompt

Figure 1-10. Configuring the "Protocol Mode"

After each parameter value has been entered, the next parameter in order will appear at the prompt, as shown in the following figure:

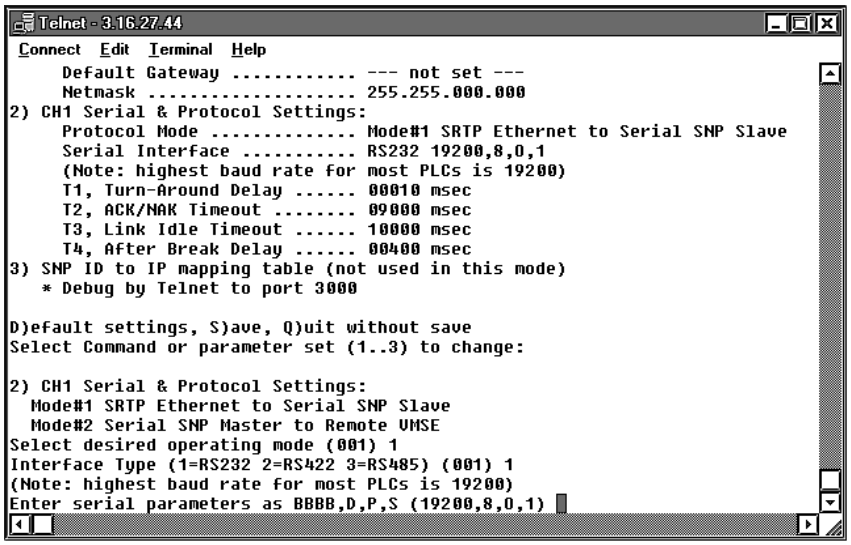
Telnet - 3.16.27.44
Connect Edit Terminal Help
Default Gateway ..... --- not set ---
Netmask 255.255.000.000
2) CH1 Serial & Protocol Settings:
Protocol Mode ..... Mode#1 SRTP Ethernet to Serial SNP Slave
Serial Interface RS232 19200,8,0,1
(Note: highest baud rate for most PLCs is 19200)
T1, Turn-Around Delay ..... 00010 msec
T2, ACK/NAK Timeout ..... 09000 msec
T3, Link Idle Timeout ..... 10000 msec
T4, After Break Delay ..... 00400 msec
3) SNP ID to IP mapping table (not used in this mode)
* Debug by Telnet to port 3000
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..3) to change:
2) CH1 Serial & Protocol Settings:
Mode#1 SRTP Ethernet to Serial SNP Slave
Mode#2 Serial SNP Master to Remote VMSE
Select desired operating mode (001) 1
Interface Type (1=RS232 2=RS422 3=RS485) (001) 1
(Note: highest baud rate for most PLCs is 19200)
Enter serial parameters as BBBB,D,P,S (19200,8,0,1)

Figure 1-11. Continuing Configuration of the "CH1 Serial & Protocol Settings"

Once you finish configuring all of the parameters in the selected group ("CH1 Serial & Protocol Settings" in the above example), you will be returned to the Command Prompt where you can continue editing parameters or you can exit.

Be sure to type S if you desire to save your changes when exiting.

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MS-DOS® is a registered trademark of Microsoft, Inc.
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Chapter 2

VMSE Interfaces

Serial Interface

The VMSE has RJ45 and screw block serial ports. The RJ45 port only supports RS232, whereas the screw block port supports RS232 and RS485/422. By setting the switch located on the face of the VMSE and configuring the VMSE setup, RS232 or RS485/422 can be selected.

NOTE: The VMSE is a single serial port device, meaning that only one port can be used at a time. In the configuration menu, Channel One refers to either one of the ports being used.

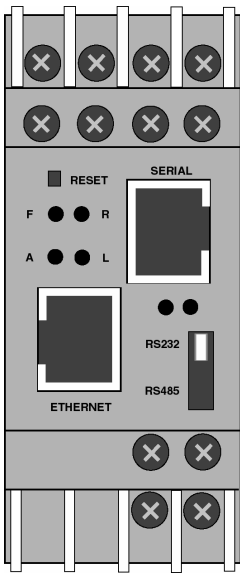


Figure 2-1. VMSE Ports and Features

Network Interface

The VMSE supports 10 Mbit Ethernet through its RJ45 (10BaseT) connector.

Hardware Address (MAC Address)

The first three bytes are fixed, and read 00-20-4A. The fourth, fifth, and sixth bytes are unique for each VMSE and are used to generate the serial number. The address is in Hex notation.

Power Requirements

The VMSE is not shipped with a power supply. The required input voltage can vary between 9VDC and 30VDC with a maximum of 3 Watts. The VMSE can be powered from the 24 Volt supply on the VersaMax, Series 90-30, or an external supply can be used. Take care not to exceed the capacity of the VersaMax or Series 90-30 power supply.

Chapter 3 Network Protocols

The VMSE product uses TCP/IP protocols for network communication. The supported standards are: ARP, UDP, TCP, ICMP, Telnet, TFTP, DHCP, and SNMP. For transparent connections, TCP/IP (binary stream) or Telnet protocols are used. Firmware upgrades can be made with the TFTP protocol.

The IP protocol defines addressing, routing and data block handling over the network. The TCP (transmission control protocol) assures that no data is lost or duplicated, and that everything sent into the connection on one side arrives at the target exactly as it was sent.

For typical datagram applications where devices interact with others without maintaining a point to point connection, a UDP datagram is used.

Packing Algorithm (PassThru Firmware only)

The two available packet algorithms (which define how and when packets are sent to the network) are software selectable. The standard algorithm is optimized for applications where VMSE is used in a local environment, allowing for very small delays for single characters while trying to keep the packet count low. The alternate packing algorithm minimizes the packet count on the network, and is especially useful for applications in routed Wide Area Networks. Various parameters can be set in this mode to economize the serial data stream.

IP Address

Every active device connected to the TCP/IP network must have a unique IP address. This IP address is used to reference a specific device, for example, to build a connection to the VMSE's serial port. See Appendix A for a complete description of IP Addressing.

Port Number

Every TCP connection and every UDP datagram are defined by a destination IP address and a port number. An IP address is necessary to address a device (host) on the network. A port number is necessary to address an application or a channel on a network host. The port number can be compared to an extension on a PBX (telephone) system.

A Telnet application (login to a host with an ASCII terminal) is commonly assigned TCP port number 23. More than one Telnet connection can be established to one host using the Telnet port; however, the other peer IP address/port number combination must be different.

In the VMSE (PassThru Firmware), a port number can be configured on the channel (port). The VMSE uses this port number for outgoing messages and incoming connections or UDP datagrams, which are addressed to its port number. Port 9999 (decimal) is used for remote configuration.

Chapter 4 Configuration

The VMSE can be configured using remote or local methods. Either use an ASCII terminal or a terminal emulation program to locally access the serial port, or use a Telnet connection to configure the unit over the network.

The VMSE configuration is stored in nonvolatile flash memory and is retained without power. The configuration can be changed any time. The VMSE performs a reset after the configuration has been changed and stored.

Configuration Steps

The following steps need to be done, in the order listed, to configure the VMSE for use. These steps can be done via the serial port or over the network using Telnet.

- **Set the Network Configuration** - IP Address, Gateway Address, and Network Mask.
- **Load appropriate firmware if needed** - SRTP/SNP, PassThru, Modbus TCP/RTU.
- **Configure Channel for application** - Depends on firmware option chosen. See Chapter 1 for firmware option details.

Entering Serial Configuration Mode

An ASCII terminal or a PC with a terminal emulation program can be connected to the serial port on the VMSE. The terminal (or PC) should be configured for 9600 baud, no parity, 8 data bits, and 1 stop bit.

To enter configuration mode, input power to the VMSE must be cycled (powered off and back on). After power-up, the self-test begins. About a second later, three lowercase 'x' characters must be sent to the VMSE. These characters must all be sent within approximately one second to start the configuration mode.

NOTE: The easiest way to enter the configuration mode is to hold down the 'x' key at the terminal (emulation) and then power up the VMSE. This will ensure that the x characters will arrive in time.

See Chapter 5 for more detail on using Serial communications to configure the VMSE.

Entering Network Configuration Mode

To configure over the network, a Telnet connection to port 9999 must be established.

If you know the assigned IP address, you can establish a Telnet connection to port 9999. Under Windows 95/98/NT, open an MS-DOS command window and type the command "telnet x.x.x.x 9999", where x.x.x.x is an IP address already configured in the VMSE and 9999 is the desired TCP/IP port. Make sure you put a space between the x.x.x.x and 9999.

VMSE's IP Address

Default IP Address

The VMSE is shipped with a default IP address of 0.0.0.0, which automatically enables the DHCP within the VMSE.

If DHCP is enabled on the VMSE, and if there is a DHCP server to respond to VMSE's request when it's booting up, the VMSE will then get an IP address, a gateway address, and a subnet mask from the DHCP server. These addresses will not be shown in the VMSE's configuration screens (you will still see 0.0.0.0), however if you enter the "monitor mode" (see Chapter 5) and from the 0> prompt type NC (upper case), you will be able to see the IP configuration of the VMSE.

NOTE: Using the ARP command (see below) you can always override the IP address given to the VMSE by your DHCP server.

If DHCP is enabled on the VMSE, but there is no DHCP server on the network, the VMSE's request will eventually time out and the unit will boot up with no IP address. If a static IP address is assigned to the VMSE, the DHCP support will be disabled within the product. To re-enable DHCP support, the IP address should be set back to 0.0.0.0.

Assigning a New IP Address

If the IP Address of the VMSE is unknown or undefined, the following steps outline how to assign a temporary IP address over the network.

1. Set a static ARP with the desired IP address using the hardware address of the VMSE, which is printed on the product label. The following example shows the use of ARP in Win95/98/NT (from the DOS prompt) when the hardware address of the VMSE is 00-20-4A-01-64-0B.

   In order for the ARP command to work in Windows, the ARP table on the PC must have at least one IP address defined other than its own. Type “ARP–A” at the DOS command prompt to verify that there is at least one entry in the ARP table. If there is no entry other than for the local machine, ping another IP machine on your network to build the ARP table. This has to be a host other than the machine on which you are working. Once there is at least one entry in the ARP table, use the following commands to ARP an IP address to the VMSE.

   arp -s 191.12.3.77 00-20-4A-01-64-0B

2. Open a Telnet connection to port number 1. This connection will fail, but the VMSE will change its IP address to the one designated in the ARP command line.

   telnet 191.12.3.77 1

3. Open a Telnet connection to port 9999, and set all required parameters.

   telnet 191.12.3.77 9999

Confirm Telnet connection with <ENTER>.

NOTE: The temporary IP address by ARP is reverted after every power reset of the VMSE. Be sure to log into VMSE and store the parameters to make the IP address change permanent.

Unix

Unix arp details when the hardware address of the VMSE is 00-20-4A-01-64-0B.

The command example for most Unix systems is:

arp -s 191.12.3.77 00:20:4A:01:64:0B

Configuration Parameters

After configuration mode is entered (confirm with <ENTER>), the parameters can be changed; default values can be confirmed with the ENTER key. The parameters must be saved , and the VMSE performs a power reset.

The Configuration for each of the firmware loads of the VMSE is slightly different. If you need to load a different firmware than is in the VMSE, load the firmware first, and then follow the directions for configuration for the appropriate firmware. The next sections contain the details for configuration setup for each of the firmware loads.

SRTP/SNP Firmware – Configuration Setup

Figure 4.1 shows the Main Configuration screen for SRTP/SNP Firmware.

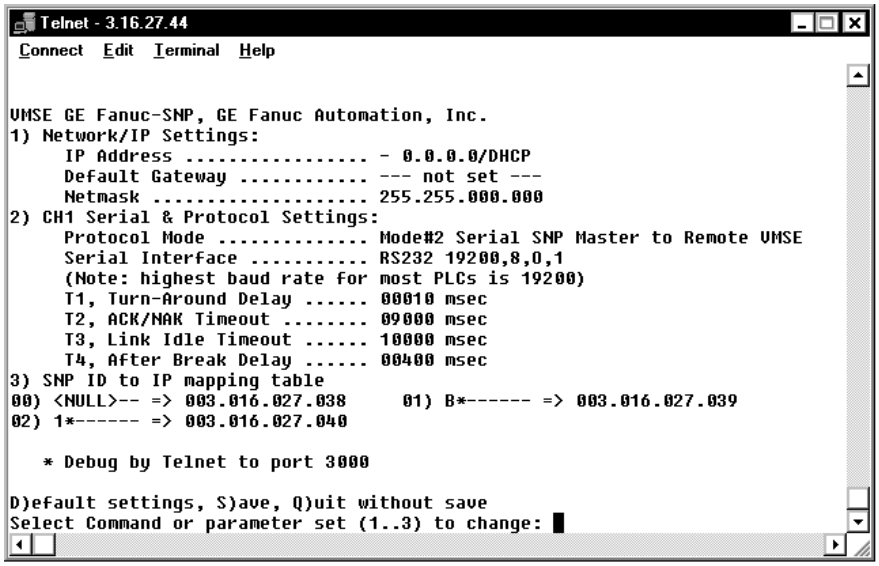

Telnet - 3.16.27.44
Connect Edit Terminal Help
VMSE GE Fanuc-SNP, GE Fanuc Automation, Inc.
1) Network/IP Settings:
IP Address ..... - 0.0.0.0/DHCP
Default Gateway ..... --- not set ---
Netmask 255.255.000.000
2) CH1 Serial & Protocol Settings:
Protocol Mode ..... Mode#2 Serial SNP Master to Remote VMSE
Serial Interface RS232 19200,8,0,1
(Note: highest baud rate for most PLCs is 19200)
T1, Turn-Around Delay ..... 00010 msec
T2, ACK/NAK Timeout ..... 09000 msec
T3, Link Idle Timeout ..... 10000 msec
T4, After Break Delay ..... 00400 msec
3) SNP ID to IP mapping table
00) <NULL>-- => 003.016.027.038
01) B*------ => 003.016.027.039
02) 1*------ => 003.016.027.040
* Debug by Telnet to port 3000
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..3) to change:

Figure 4-1. SRTP/SNP Firmware Configuration Screen

When finished with this screen, you have three choices:

- Press the “S” key to exit and save your changes.
- Press the “Q” key to exit without saving your changes.
- Press the “D” key to return to the default settings.

Network / IP Settings

To change the Network/IP settings, press ‘1’. The following values can be set/changed: IP Address, Gateway Address, NetMask.

IP Address

The IP address must be set to a unique value in your network. If you are not familiar with IP addresses, please refer to Appendix A.

If the VMSE is given an address that is already in use it will not connect to the network.

Gateway IP Address

The router/gateway address is needed to communicate to other LAN segments. The default gateway must be set to the IP address of the router that connects these segments. This address must be within the local network.

Netmask

A netmask defines how many bits from the IP address are to be taken as the network section and how many bits are to be taken as the host section (re class A: 8/24 (net/host), class B: 16/16, class C: 24/8 bits). If set to 0, the standard netmask for the actual IP address is used. Appendix A covers the calculation of the right value in detail.

The VMSE prompts for the number of host bits, and then calculates the netmask. It is shown in standard format “255.255.xxx.xxx” when saved parameters are displayed.

Channel, Serial, and Protocol Setups

To change the Channel settings, press '2'. The following values can be set/changed: Protocol Mode, Serial Interface setup, SNP T1-T4 timers.

Note: SNP T1 thru T4 timers should not be modified under normal circumstances. A thorough knowledge of SNP is required to modify the T1 – T4 timeouts.

SRTP/SNP Protocol Mode

The SRTP/SNP mode needs to be set based on how the VMSE will be used.

Mode#1 - The most common usage (and the default) is for the VMSE to be connected to a SNP slave. For this usage set the SRTP/SNP mode to MODE#1 (Enter a "1"). This is what is used for VersaPro or HMI to communicate with a PLC by using a VMSE at the PLC.

Mode#2 – Mode#2 is used to connect a SNP master to the network using a VMSE. An example of this is:

A Series 90 PLC with a serial port set up for SNP where COMMREQs are used to communicate with other PLCs.

Serial Interface Configuration

Enter the interface setup as BBBB,D,P,S where BBBB is the baud rate (default is 19200, D is the number of data bits (must be 8), P is parity (SNP defaults to O, the letter "O" not zero, S number of stop bits (must be 1).

The Default setting is the same as PLC defaults; 19200 Baud, 8 data bits, Odd parity, and 1 stop bit.

SNP T1 – T4 Timers

T1 – Turn-Around Delay

T2 – ACK/NAK Timeout

T3 – Link Idle Timeout

T4 – After Break Delay

SNP ID to IP Address Mapping (only for SRTP/SNP Mode#2)

This setting is used only when VMSE configuration Mode#2 is used. This setting directs messages to the VMSE which has the IP address that corresponds to the SNP address in this mapping table. Up to four SNP IDs to IP addresses can be entered. Wildcards are to be used to allow multiple SNP IDs for communicate to PLCs multidropped off of one VMSE. An example would be to enter:

SNP ID "A* " IP Address 3.0.0.1

The SNP IDs "A1", "AA", and APPLE would all go the VMSE with the IP address 3.0.0.1 The PLCs with the correct SNP ID would respond to the SNP message

PassThru Firmware Configuration Setup

Figure 4.2 shows the Main Configuration screen for PassThru Firmware.

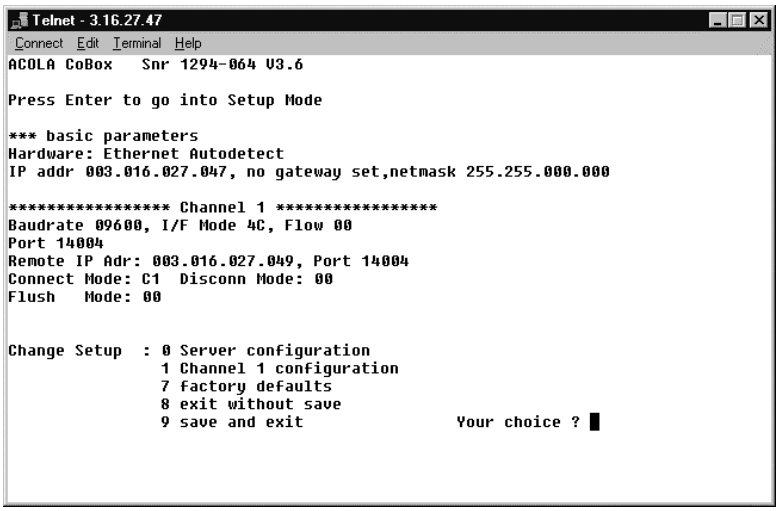

Telnet - 3.16.27.47
Connect Edit Terminal Help
ACOLA CoBox Snr 1294-064 V3.6
Press Enter to go into Setup Mode
*** basic parameters
Hardware: Ethernet Autodetect
IP addr 003.016.027.047, no gateway set,netmask 255.255.000.000
****************** Channel 1 ******************
Baudrate 09600, I/F Mode 4C, Flow 00
Port 14004
Remote IP Adr: 003.016.027.049, Port 14004
Connect Mode: C1 Disconn Mode: 00
Flush Mode: 00
Change Setup : 0 Server configuration
1 Channel 1 configuration
7 factory defaults
8 exit without save
9 save and exit
Your choice ?

Figure 4-2. Pass Thru Firmware Configuration Screen

When finished with this screen, you have three choices:

- Press the “9” key to exit and save your changes.
- Press the “8” key to exit without saving your changes.
- Press the “7” key to activate the default settings.

Basic Parameters

To change the basic parameters (Server Configuration), press ‘0’. The following values can be set/changed: IP Address, Gateway Address, NetMask, and Telnet Password.

IP Address

The IP address must be set to a unique value in your network. If you are not familiar with IP addresses, please refer to Appendix A.

If the VMSE is given an address that is already in use it will not connect to the network.

Gateway IP Address

The router/gateway address is needed to communicate to other LAN segments. The default gateway must be set to the IP address of the router port that is on the local network.

Netmask

A netmask defines how many bits from the IP address are to be taken as the network section and how many bits are to be taken as the host section (defaults are: class A: 8/24 (net/host), class B: 16/16, class C: 24/8 bits). If set to 0, the standard netmask for the actual IP address is used. Appendix A covers the calculation of the right value in detail.

The VMSE prompts for the number of host bits, and then calculates the netmask. It is shown in standard format “255.255.xxx.xxx” when saved parameters are displayed.

Telnet Configuration Password

The telnet configuration password can be set to disable unauthorized access to the setup menu via a Telnet connection to port 9999. To access the setup menu through the serial port, it is not necessary to enter the password. Entering “2” moves you to the Channel Specific Parameters screen.

Channel 1 Parameters

To change the Channel 1 configuration, press "1". The following sections describe the item that can be changed and the values to use.

Baud Rate

The baud rate can be set within the defined limits from 300 to 38400 bits per second.

Interface Mode

The line interface (I/F) mode is a bit-coded byte with the following meanings. It is entered in hexadecimal notation:

Function	7	6	5	4	3	2	1	0
RS-232C							0	0
RS-422 / 485 RS485 2-wire							0 1	1 1
7 Bit					1	0		
8 Bit No parity			0	0	1	1		
Even Parity Odd Parity			1 0	1 1				
1 Stop Bit 2 Stop Bit	0 1	1 1						

Figure 4-3. Interface Mode Operation

Common settings:

RS-232C, 8-bit, No Parity, 1 stop = 0x4C
RS-232C, 7-bit, Even Parity, 1 stop = 0x78
RS-485, 2-Wire, 8-bit, No Parity, 1 stop = 0x4F
RS-422, 8-bit, Odd Parity, 2 stop = 0xDD

The bit combination can be easily converted to hexadecimal notation for input. See Appendix B for conversion tables.

Flow Control

This parameter sets the local handshake method for stopping and starting output. Generally, flow control is not required if the connection is used to pass a blocked protocol with block sizes <1k (ACK/NAK).

No flow control: 00

XON/XOFF flow control in both directions: 01

Hardware handshake with RTS/CTS lines: 02

XON/XOFF, pass characters to host: 05

Port Number

This setting is the source port number in TCP connections, and is the number used to identify the channel for remote initiating connections. The port number may not be set to 0 or 9999 (range: 1-65535). In general the port numbers 0..1023 are reserved in UNIX systems for specific applications. It is advisable to use numbers in the range 2000-30000 to avoid potential conflicts.

If the UDP Datagram mode is selected, the port number is used as the UDP source port number for outgoing datagrams; datagrams sent to the VMSE with this port number are received to this channel.

Remote IP Address

When automatic connection mode is selected, a connection is made to this IP address on the network.

Remote TCP Port

The remote TCP port number must be set to use automatic connections and can also be configured for manual connect mode. This parameter defines the port number on the target host to which a connection is attempted.

NOTE: To connect an ASCII terminal to a host using a VMSE for login purposes, use the remote port number 23 (this is the Internet standard port number for Telnet services).

This port number is also used as the UDP destination port number for transmitted datagrams, provided the VMSE is used in UDP mode.

Connect Mode

This parameter defines how the VMSE makes a connection and how it reacts to incoming connections over the network.

Function	*7*	*6*	*5*	*4*	*3*	*2*	*1*	*0*
Connection Acceptance								
Never accept incoming	0	0	0					
Accept incoming with active DTR only	0	1	0					
Accept unconditional (if not busy)	1	1	0					
Response on Serial to Connect								
Nothing (quiet)				0				
Character response (C= conn, D-disc, N=not available/unreachable)				1				
Active Connection Startup								
No active connection startup					0	0	0	0
Start connection with any character on the serial line					0	0	0	1
Start connection with active-going DTR line					0	0	1	0
Start connection with CR (0x0d) only					0	0	1	1
Manual connection startup (‘C’ + address)					0	1	0	0
Datagram mode					1	1	0	0
Modem Emulation Mode					0	1	1	0

Figure 4-4. Connect Mode Options

Please refer to Appendix B for information on converting values to hexadecimal format.

Automatic Connection Address

Using either of the serial ports, an automatic TCP connection to a network node can be configured by setting the remote IP address and the TCP port number parameters.

If automatic connection is selected, all parameters must be supplied in full.

If manual connection startup is configured (with "C" + address/port), only the part not supplied in the command string is used. In manual mode, the last byte of the address must be supplied.

Example: The configured remote IP address within the VMSE is 129.1.2.3 and the TCP port number is 1234 :

***C121.2.4.5/1*<ENTER>**
complete override - connection is started with host 121.2.4.5, port 1.

***C5*< ENTER >**

This means connect to 129.1.2.5, port 1234.

C28.10/12< ENTER >
This means connect to 129.1.28.10, port 12.

Datagram Mode

When selecting this option you will be prompted for Datagram type

Datagram type: 01 (Directed UDP)

Modem Emulation Mode

In modem emulation mode, the VMSE presents a modem interface to the attached serial device by accepting AT-style modem commands and "wiggles" the modem signals correctly. Normally there is a modem connected to a PC and a modem connected to some other remote machine. A user must dial from his/her PC to the remote machine and accumulate phone charges for each connection. With the VMSE in modem mode, you can replace your modems with VMSE and use an Ethernet connection instead of a phone call all without having to change communications applications and make potentially-expensive phone calls.

Modem mode is selected by setting the "connect mode" to 0x06 (no echo & acknowledgments) or 0x16 (with echo & acknowledgments.) In modem mode the following strings can be used:

ATDTx.x.x.x,pppp or ATDTx.x.x.x/pppp

This is used to make a connection to an IP address (x.x.x.x) and a remote port number (pppp.)

ATDTx.x.x.x

Without a port number, this will make a connection to the remote port number defined within the VMSE.

ATD

If no remote IP address and port number are defined within the VMSE, this command will force the VMSE into "monitor mode".

ATD0.0.0.0

If a remote IP address and port number are defined within the VMSE, this command will force the VMSE into "monitor mode".

ATDx.x.x.x

Without a port number, this will make a connection to the given IP address (x.x.x.x) and the remote port number configured within the VMSE.

All other 'AT' commands with "connect mode" set to 0x16 will acknowledge with an OK, but will not be acted upon.

If the VMSE is in modem emulation mode and the serial port is idle, the VMSE can still accept network TCP connections to the serial ports if the "connect mode" is set to 0xC6 (with no echo) or 0xD6 (with echo).

Disconnect Mode

In disconnect mode, DTR drop can be activated or ignored to end a connection:

- Disconnect with DTR drop: 80
- Ignore DTR: 00

Force Telnet Mode

With another bit in the disconnect mode, the VMSE can be forced into Telnet (terminal) mode and the setup for the terminal name can be enabled:

- activate Telnet mode and terminal type setup: 40

Buffer Flushing

With this parameter it is possible to control line handling and network buffers with connection startup and disconnect. Also, selection between two different packing algorithms is possible.

Function	7	6	5	4	3	2	1	0
Clear input buffer (line to network)								
With active connection				1				
With passive connection			1					
At time of disconnect		1						
Clear output buffer (network to line)								
With active connection								1
With passive connection							1	
At time of disconnect						1		
Alternate packing algorithm1	1							

Figure 4-5. Buffer Flushing Options

Inactivity Timeout

With this parameter an inactivity time can be set. If the set time expires without an activity on the serial line, the connection is dropped.

Pack Control

Alternative pack algorithm settings are controlled here. Set this value to 00 if specific functions are not needed.

Function	7	6	5	4	3	2	1	0
Idle time to force transmit: 12ms (avg.)							0	0
Idle time to force transmit:52 ms (avg.)							0	1
Idle time to force transmit: 250ms (avg.)							1	0
Idle time to force transmit: 5secs (!)							1	1
No trailing chars after sendchar(s)					0	0		
One trailing char after sendchar(s)					0	1		
Two trailing chars after sendchar(s)					1	0		
Sendchars define 2-byte sequence				1				
Send immediate after Sendchar			1					

Figure 4-6. Pack Control Options

"Idle time to force transmit" defines the time period after which all accumulated characters are sent, regardless of the recognition of send characters.

In some applications, CRC, Checksum, or other trailers follow the end-of-sequence character. In these cases, this option helps to adapt frame transmission to the frame boundary.

If bit 4 is set, VMSE interprets the Sendchars as a 2-byte sequence; if reset, they will be interpreted independently.

If bit 5 is not set, any other characters already in the serial buffer will be included in the transmission after a "transmit" condition is found. If the bit is set, the VMSE will immediately send after recognizing the transmit condition (sendchar or timeout).

NOTE: A transmission might occur if status information has to be exchanged or an acknowledgement has to be sent.

Send Characters

Up to two characters can be entered in hexadecimal representation in the parameter “sendchar.” If a character received on the serial line matches one of these characters, it is immediately sent together with any awaiting characters to the TCP connection. This is specially useful to minimize the response time for specific protocol characters on the serial line (i.e. ETX, EOT etc.). Setting the first Sendchar to “00” disables the recognition of the characters.

Alternatively, the two characters can be interpreted as a sequence (see “Pack Control” section).

Telnet Terminal Type

This parameter appears only if the terminal type option is enabled by setting bit 6 in the disconnect mode. If set, the terminal name can be used for the Telnet terminal type. Only one name can be entered.

If the terminal type option is enabled, VMSE also reacts to the EOR (end of record) and binary options, which can be used for applications such as terminal emulation to IBM hosts.

Modbus TCP/RTU Firmware Configuration Setup

The next figure shows the Main Configuration screen for Modbus Firmware:

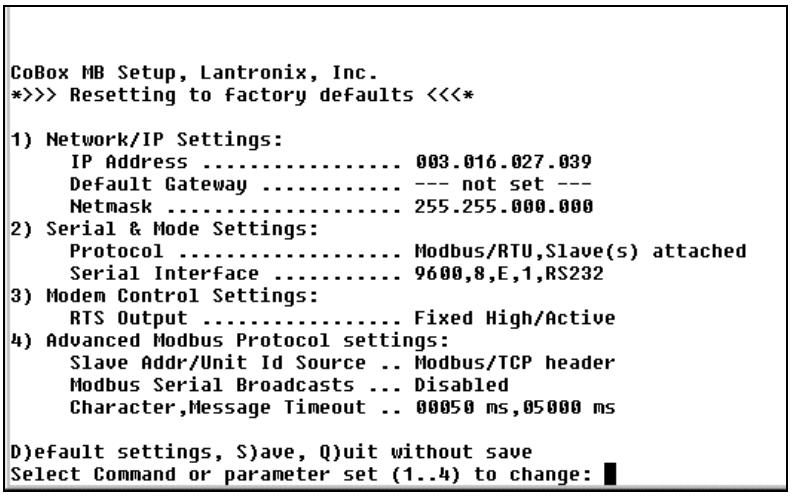

CoBox MB Setup, Lantronix, Inc.
>>> Resetting to factory defaults <<<
1) Network/IP Settings:
IP Address 003.016.027.039
Default Gateway ..... --- not set ---
Netmask 255.255.000.000
2) Serial & Mode Settings:
Protocol ..... Modbus/RTU,Slave(s) attached
Serial Interface 9600,8,E,1,RS232
3) Modem Control Settings:
RTS Output ..... Fixed High/Active
4) Advanced Modbus Protocol settings:
Slave Addr/Unit Id Source .. Modbus/TCP header
Modbus Serial Broadcasts ... Disabled
Character,Message Timeout .. 00050 ms,05000 ms
D)efault settings, S)ave, Q)uit without save
Select Command or parameter set (1..4) to change:

Figure 4-7. Modbus Hardware Configuration Screen

When finished with this screen, you have three choices:

- Press the “S” key to exit and save your changes.
- Press the “Q” key to exit without saving your changes.
- Press the “D” key to return to the default settings.

Network/IP Settings

To change the Network/IP settings, press ‘1’. The following values can be set/changed: IP Address, Gateway Address, NetMask

IP Address

The IP address must be set to a unique value in your network. If you are not familiar with IP addresses, please refer to Appendix A.

If the VMSE is given an address that is already in use it will not connect to the network.

Gateway IP Address

The router/gateway address is needed to communicate to other LAN segments. The default gateway must be set to the IP address of the router that connects these segments. This address must be within the local network.

Netmask

A netmask defines how many bits from the IP address are to be taken as the network section and how many bits are to be taken as the host section (re class A: 8/24 (net/host), class B: 16/16, class C: 24/8 bits). If set to 0, the standard netmask for the actual IP address is used. Appendix A covers the calculation of the right value in detail.

The VMSE prompts for the number of host bits, and then calculates the netmask. It is shown in standard format “255.255.xxx.xxx” when saved parameters are displayed.

Serial and Mode Settings

To change the Channel settings, press ‘2’. The following values can be set/changed: Protocol, Serial Interface

Protocol

At the first prompt, select 1 for Save or 2 for Master. At the second prompt, select 1 for Modbus/RTU or 2 for Modbus/ASCII.

Serial Interface

Enter the interface setup as BBBB,D,P,S,RSxxx where BBBB is the baud rate (default is 19200), D is the number of data bits , P is parity, S number of stop bits, and RSxxx is 232 or 485 .

Modem Control Settings

To change the Modem settings, press ‘3’. The following value can be set/changed: RTS Output

Advanced Modbus Protocol Settings

To change the Channel settings, press ‘4’. The following values can be set/changed: Slave Addr/Unit ID , Modbus Serial Broadcasts, Character/Message Timeouts.

Modbus ID to IP Address Mapping (only used for Master)

This setting is only available when Master is chosen. Entering “5” gives you the Mapping screen.

Chapter 5

Monitor Mode and Firmware Upgrade

To enter monitor mode: The same principle as setting the parameters is used (see chapter 4). To enter Monitor Mode using a serial connection. Power cycle the unit and hold down the "x" key. The within one second the prompt

UTS Snr 222-195 V3.5

Press Enter to go to Setup Mode

With appear.

At this point type "M"(must be uppercase)

The prompt 0> will appear, which indicates Monitor mode has been entered.

To enter the monitor mode using a Telnet connection: After the Telnet session is established, you will see messages similar to the following examples:

Serial Number 1103062 MAC Address 00:20:4A:11:0B:F6

Software Version 00.9B1 (000630)

Press Enter to go into Setup Mode (wait to close)

At this point, type M (upper case). If you see the 0> prompt, it means that you have entered the monitor mode successfully.

Monitor Commands

The following commands are available in the monitor mode. Many commands have an IP address as an optional parameter (x.x.x.x). If it is given, the command is applied to another VMSE with that IP address. If no IP address is given, the command is executed locally.

All commands must be given in capital letters; only blanks (spaces) are accepted between parameters.

Command	Description
DL	Download firmware to the VMSE
SF x.x.x.x	Send firmware to VMSE with IP x.x.x.x
VS x.x.x.x	Query software header record (16-byte)
GC x.x.x.x	Get configuration as HEX records
SC x.x.x.x	Set configuration from HEX records
PI x.x.x.x	Check with Ping if x.x.x.x is alive and reachable
AT	Show the VMSE's ARP table entries
TT	Shows all the incoming and outgoing TCP connections (used only with "monitor mode" from Telnet)
NC	Shows the IP configuration of the VMSE
RS	Resets the power on the VMSE
SI x.x.x.x:n.n.n.n	With this command, you can remotely assign an IP address to another VMSE, where x.x.x.x is the new IP address and n.n.n.n is the remote VMSE serial number written twice. For example: **SI194.39.78.234:146.138.146.138** **IP address = 194.39.78.234** **Remote VMSE serial # (146-138) = 146.138.146.138** ***NOTE:*** Since this is obtained by sending broadcast packets, this IP assignment cannot be done over the routers.
QU	Quit - exit diagnostics mode

Command result codes:

0 OK, no error
1 No answer from remote device
2 Cannot reach remote device or does not answer
8 Wrong parameter(s)
9 Invalid command

Firmware Download Using Serial Port

Downloading is done in monitor mode. Once the VMSE is in monitor mode, by using "DL" command, the VMSE will wait for the firmware image in Intel Hex format. This must only be sent through the serial interface. When the end record is received, the VMSE checks the integrity of the firmware image and then programs the new firmware in the flash ROM**. Do not switch off the power supply at this time. A loss of power while reprogramming will result in a corrupt program image and a nonfunctional VMSE.**

To load firmware with Hyperterminal, enter monitor mode by resetting the VMSE and type xx1 after the * appears on the screen (you have about 1 second to type xx1).

The 0> prompt tells you that you have entered Monitor mode

Type DL to enter download mode.

Note: you will need to disconnect the Ethernet cable from the VMSE before you do the download.

You must now use the Hyperterminal menu bar and select Transfer… Send Text File. This will give you a dialog box to select the file to download. Select the .hex file for the firmware you want to load. The download will take about five minutes and the hyperterminal will appear dead until the download completes. You must allow sufficient time for the download to complete, otherwise you may not be able to communicate with the VMSE. The figure below shows the results after the download completes successfully.

After a complete reprogramming, the VMSE restarts.

After changing the firmware load in the VMSE, select defaults on the new firmware before setting the configuration to your desired settings; this keeps the VMSE from becoming confused.

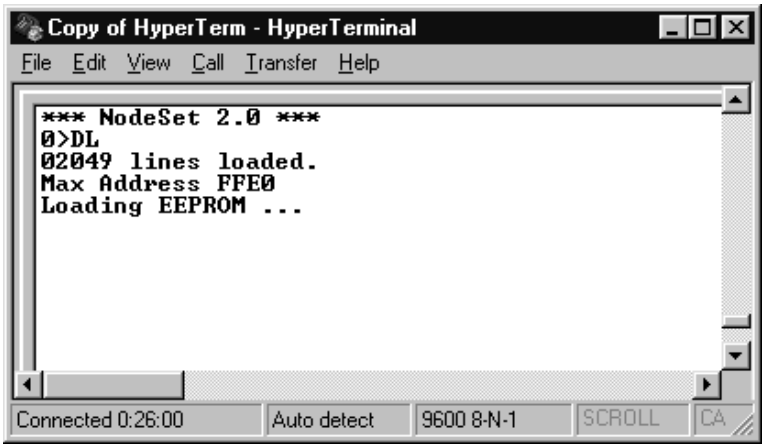


Figure 5-1. HyperTerminal Dialog Box

Firmware Distribution

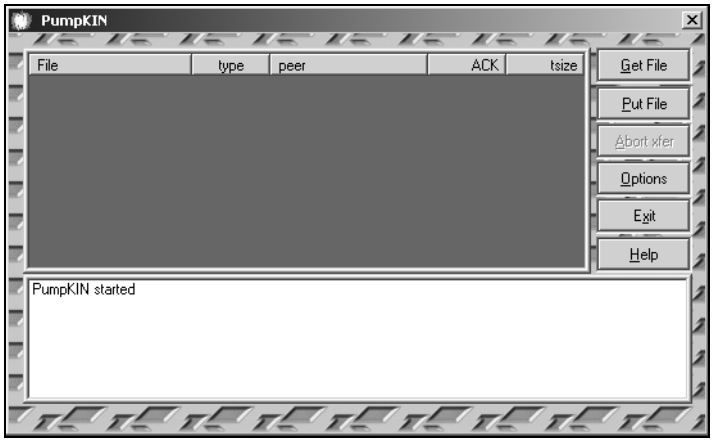
To distribute the firmware of one VMSE to others, the “SF” command is used. After entering monitor mode on the VMSE, simply send the firmware with the “SF” command to the other devices.

Firmware Download Using a Network Host

PumpKIN TFTP Program

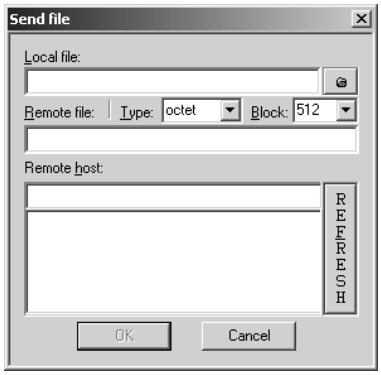
The TFTP program PumpKIN from Klever is distributed on the VMSE CD. Install the PumpKIN program on your computer by double clicking on the PumpKIN.EXE file. The PumpKIN program will be installed in the ACCESSORIES Menu.

Start PumpKIN and you will see the PumpKIN window



Click on the Put File Button to download new firmware to the VMSE

Click on the browse button next to local file, browse to the firmware you wish to download.



Enter the remote file, this is essentially a password

Enter the IP address of the VMSE in the Remote Host text box.

Click OK to download the firmware.

Version "BB" and later versions of VMSE use different Firmware files than Version "AA". Make sure the correct files are used for the version VMSE that is having firmware loaded.

VMSE Firmware File List: For IC200SET001-BB

Functionality	File for Serial Download	File for Network Download	Destination (password)
SNP/SRTP	SNPD0151.HEX	SNPD0151.ROM	G3
PassThru	AQGD510.Hex	AQGD510.ROM	G3
Modbus	MBGD0200.Hex	MBGD020.Rom	G3

Note: The number in each file denotes revision, newer revisions if available will be posted on the GE Tech Support WEB site.

VMSE Firmware File List: For IC200SET001-AA

Functionality	File for Serial Download	File for Network Download	Destination (password)
SNP/SRTP	SNP100.HEX	SNP100.ROM	G1
PassThru	Cbx410.Hex	Cbx410.ROM	3Q
Modbus	Mod12.Hex	Mod12.Rom	4D

Destination (Password)

Destination (password) for Network loads, for version "AA" only, depend on what file is already in the VMSE. Enter the Destination code based on what is already in the VMSE not on what you are downloading.

For example, if you are downloading PassThru into a new unit which has the default software of SNP/SRTP, you would enter a destination of G1. **Note: The destination is case sensitive. The letter "G" in this example must be upper case.**

Windows® NT Procedure

To download new firmware from a computer to a VMSE, it is necessary to have a TFTP (Trivial File Transfer Protocol) client send a binary file. Windows NT has a TFTP client built-in, but Windows 95/98 users must obtain TFTP software. See the "Obtaining TFTP Software for Windows 95/98" section on the last page of this chapter. The parameters to send a binary file are as follows:

- Host – enter the IP address of the VMSE you are downloading.
- Source (or Local File) – a full path to the file to download to the VMSE.
- Destination (or Remote File) – this a like a password in the VMSE you are downloading.
- PUT– send the file to the VMSE.

Go to the Command Prompt (MS-DOS Prompt), enter the above information, then press the Enter key. See the example that follows:

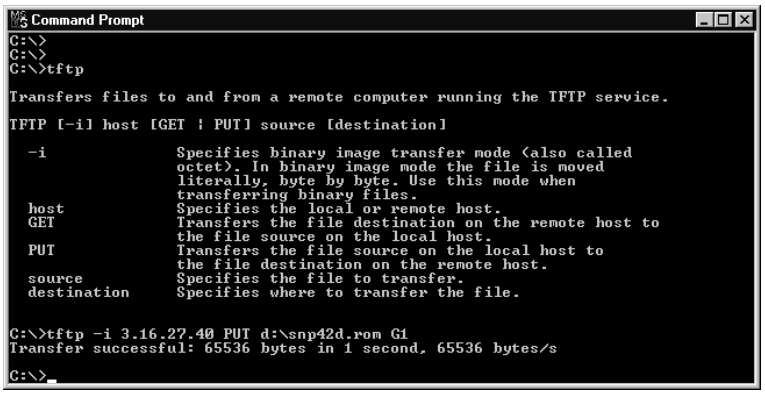
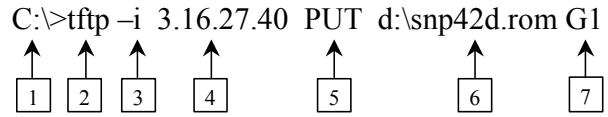

Command Prompt
C:\>
C:\>
C:\>tftp
Transfers files to and from a remote computer running the TFTP service.
TFTP [-i] host [GET | PUT] source [destination]
-i Specifies binary image transfer mode (also called octet). In binary image mode the file is moved literally, byte by byte. Use this mode when transferring binary files.
host Specifies the local or remote host.
GET Transfers the file destination on the remote host to the file source on the local host.
PUT Transfers the file source on the local host to the file destination on the remote host.
source Specifies the file to transfer.
destination Specifies where to transfer the file.
C:\>tftp -i 3.16.27.40 PUT d:\snp42d.rom G1
Transfer successful: 65536 bytes in 1 second, 65536 bytes/s
C:\>

Figure 5-2. Using TFTP in Windows NT to store files to the VMSE

The example screen shows a successful store to the VMSE at IP address 3.16.27.40.

Windows NT Command Line Example Code Explanation



1. C:\> is the command prompt
2. tftp is the execute command for the TFTP software
3. -i tells TFTP to send a binary file

4. The host field is the IP address of the target VMSE
5. PUT is the command that sends the file to the VMSE
6. The source file (including full path) to be sent to the VMSE
7. The destination field is like a password in the target VMSE

Version "BB" and later versions of VMSE use different Firmware files than Version "AA". Make sure the correct files are used for the version VMSE that is having firmware loaded.

VMSE Firmware File List: For IC200SET001-BB

Functionality	File for Serial Download	File for Network Download	Destination (password)
SNP/SRTP	SNPD0151.HEX	SNPD0151.ROM	G3
PassThru	AQGD510.Hex	AQGD510.ROM	G3
Modbus	MBGD0200.Hex	MBGD020.Rom	G3

Note: The number in each file denotes revision, newer revisions if available will be posted on the GE Tech Support WEB site.

VMSE Firmware File List: For IC200SET001-AA

Functionality	File for Serial Download	File for Network Download	Destination (password)
SNP/SRTP	SNP100.HEX	SNP100.ROM	G1
PassThru	Cbx410.Hex	Cbx410.ROM	3Q
Modbus	Mod12.Hex	Mod12.Rom	4D

Destination (Password)

Destination (password) for Network loads depend on what file is already in the VMSE. Enter the Destination code based on what is already in the VMSE not on what you are downloading.

For example, if you are downloading PassThru into a new unit which has the default software of SNP/SRTP, you would enter a destination of G1. **Note: The destination is case sensitive. The letter "G" in this example must be upper case.**

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Chapter 6

Serial Line Interfaces

Serial Line Interfaces

The VMSE has RJ45 and screw block serial ports. The RJ45 port only supports RS-232, whereas the screw block port supports RS-232 and RS-485/422. By setting the switch located on the face of the VMSE and by selecting the matching setting with the configuration software, RS-232 or RS-485/422 can be selected.

NOTE: The VMSE is a one serial port device, meaning that only one port can be used at a time. In the configuration menu, Channel One refers to either one of the ports being used. If Channel Two appears, it should be disregarded (this channel applies to another type of product).

RJ45 Connector Pin-outs (RS-232)

The serial RJ45 connector supports up to 38400 bits per second and has the following signals.

Pin	*Direction*	*Function*
1	Not Connected	None
2	From VMSE	RTS Ready to Send
3	To VMSE	CTS Clear to Send
4		Signal Ground
5	From VMSE	TXD Transmitted Data
6	To VMSE	RXD Received Data
7	Hard-Wired Output	DSR Data Set Ready
8	Not Connected	None

Figure 6-1. Serial RJ-45 (RS-232) Pin-out Configuration

NOTE: Pin number 1 of the RJ-45 serial connector is the first pin from the top.

Screw Block Connector Pin-outs and Other Components

The next figure and following table illustrate and describe the screw block connector pin-outs, LED operation, and other features of the VMSE.

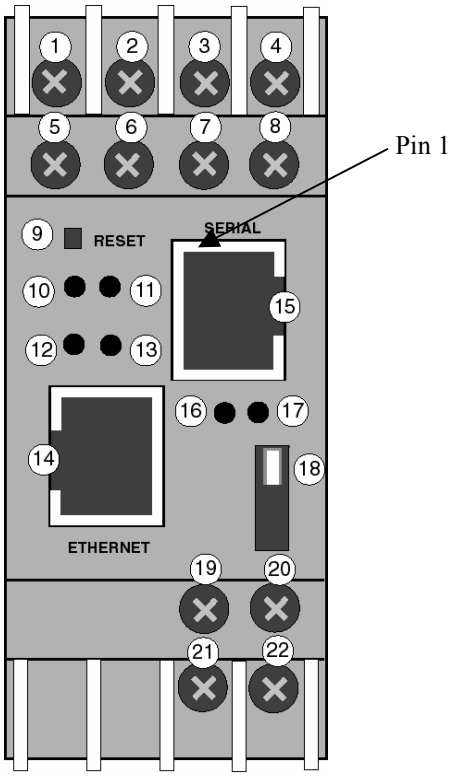


Figure 6-2. Front Panel Layout

Item	Component	Name	Purpose
1	Screw terminal	RXD or RXA	RS-232: RXD (Received Data) RS-422/485:RXA (Received Data -)
2	Screw terminal	CTS or RXB	RS-232: CTS (Clear to Send) RS-422/485: RXB (Received Data +)
3	Screw terminal	RTS or TXB	RS-232: RTS (Request to Send) RS-422/485: TXB (Transmit Data +)
4	Screw terminal	TXD or TXA	RS-232: TXD (Transmit Data) RS-422/485: TXA (Transmit Data -)
5,6,7	Screw terminal	NC	No connection
8	Screw terminal	GND	Signal ground
9	Reset switch	RESET	Push to power reset and initialize
10	LED (Red) Labeled “F”	Fault or Configuration	SOLID: Fault in VMSE communication (read error) or VMSE is in Configuration Mode
11	LED (Green) Labeled “R”	Ready	SOLID: Connection to network host established
12	LED (Yellow) Labeled “A”	Activity	FLASHING: Network traffic
13	LED (Green) Labeled “L”	Link	SOLID: VMSE has good Ethernet link
14	Connector (RJ45)	Ethernet port	RJ45 connector for Ethernet 10BaseT
15	Connector (RJ45)	Serial port	RJ45 connector for RS-232
16	LED (Yellow)	Serial TXD	FLASHING: Indicates transmission from the serial port
17	LED (Yellow)	Serial RXD	FLASHING: Indicates reception to the serial port
18	Switch	Switch for screw block	UP: Serial RS-232 DOWN: Serial RS-422/485
19	Screw terminal	DC +	Operating power, positive
20	Screw terminal	Ground	Earth ground
21	Screw terminal	DC -	Operating power, negative
22	Screw terminal	Ground	Earth ground

Figure 6-3. Front Panel Components

Notes:

- For RS-485 2-wire functionality, pins 1 & 4 and 2 & 3 of the screw terminals must be connected together.
- The RJ-45 Ethernet connector uses industry standard 10Base T connections.

Cable Diagrams

Cable IC200CBL504

RS-232 Serial Communications for VMSE RJ45 Serial Port to VersaMax Nano/Micro PLC RJ45 Port

This cable is shipped in the box with the VMSE and can also be purchased separately.

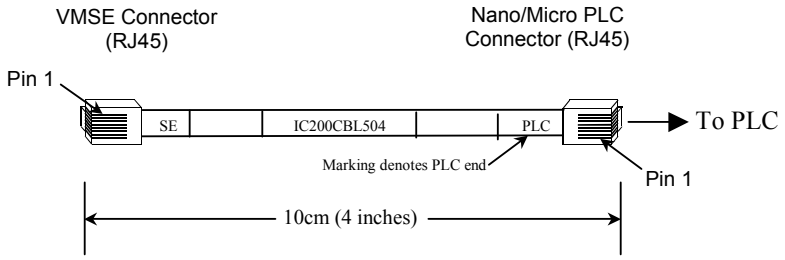


Figure 6-4. IC200CBL504 Cable

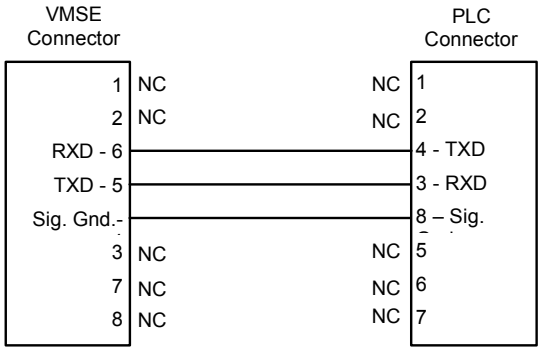


Figure 6-5. Wiring Diagram for IC200CBL504

User-Built Cable #1: VMSE RJ45 Serial to Miniconverter

This cable is not currently sold by GE. Details are provided so you can build your own cable.

Application:

To connect a VMSE's RJ-45 Serial port (RS-232) to the RS-232 port of an IC690ACC901 Miniconverter (RS-232 to RS422/485).

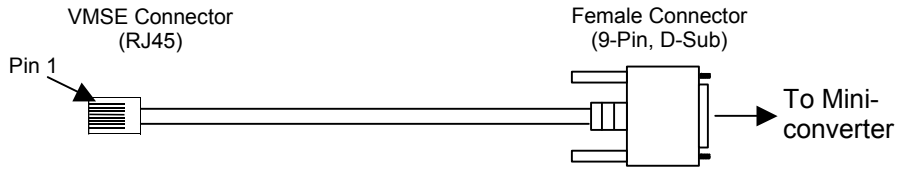


Figure 6-6. VMSE RJ45 Serial to RS232/485 Miniconverter

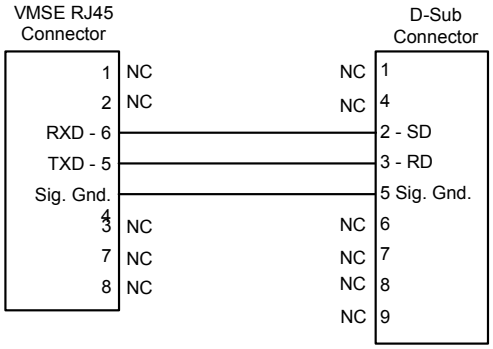


Figure 6-7. Wiring Diagram

Specifications

- RJ45 Connector: Male, 8-pin
- D-Sub Connector: Female, 9-pin
- Cable: Standard RS-232 serial cable
- Maximum cable length: 15 meters (50 feet)

User-Built Cable #2: VMSE RJ45 Serial to PC 9-Pin Sub-D

For Serial Monitor/Load of VMSE

This cable is not currently sold by GE. Details are provides so you can build your own cable.

Application:

To connect a personal computer's RS-232 serial port to a VMSE's RJ-45 Serial port for the purpose of (1) monitoring VMSE operation or (2) downloading firmware to the VMSE.

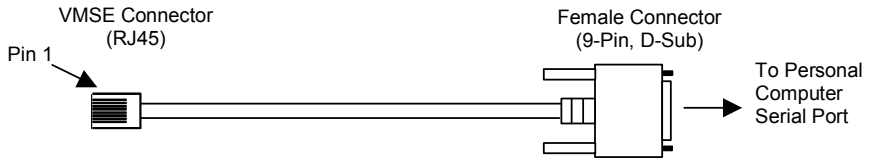


Figure 6-8. Cable for Serial Monitor/Load of VMSE

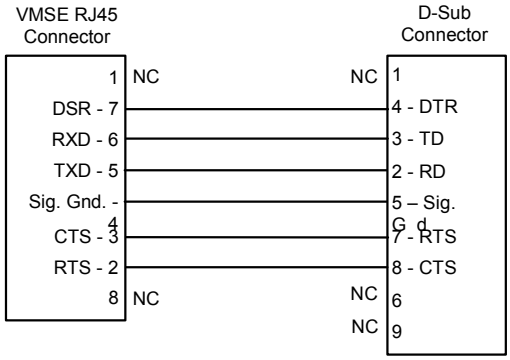


Figure 6-9. Wiring Diagram

Specifications

- RJ45 Connector: Male, 8-pin
- D-Sub Connector: Female, 9-pin
- Cable: Standard RS-232 serial cable
- Maximum cable length: 15 meters (50 feet)

User-Built Cable #3: VMSE RJ45 Serial to PC 9-pin D-Sub

This cable is not currently sold by GE . Details are provides so you can build your own cable.

Application:

To connect the serial port (RS-232) of a personal computer (PC) running VersaPro software to a VMSE's RJ-45 Serial port (RS-232).

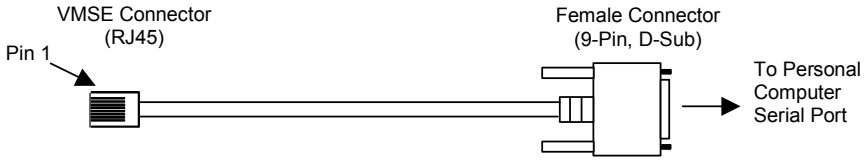


Figure 6-10. VMSE to VersaMax Serial Cable

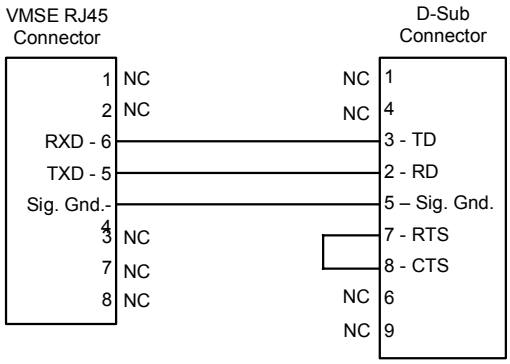


Figure 6-11. Wiring Diagram

Specifications

- RJ45 Connector: Male, 8-pin
- D-Sub Connector: Female, 9-pin
- Cable: Standard RS-232 serial cable
- Maximum length: 15 meters (50 feet)

User-Built Cable #4: VMSE RS-422 Terminals to PLC

This cable is not currently sold by GE. Details are provides so you can build your own cable.

Application:
Connects the VMSE terminal block screw terminals to a PLC 15-pin, D-sub, RS-422/RS-485 port such as is used on Series 90-30, Series 90-70, and VersaMax PLCs. Note that the VMSE switch must be set in the RS-422 position and the firmware configuration parameter "Interface Type" must be set to RS-422 ("Interface Type" set to RS-485 will not work).

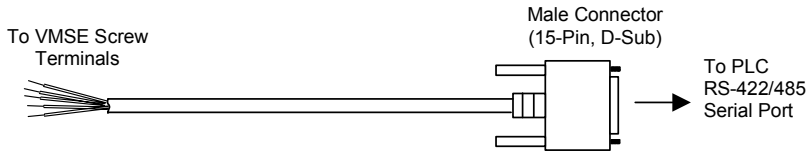


Figure 6-12. VMSE Screw Terminals to 15-Pin D-Sub PLC Serial Port

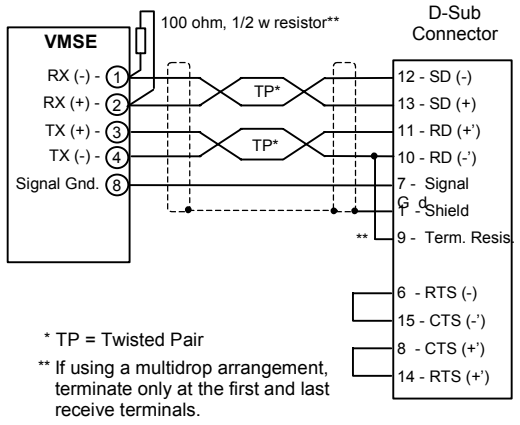


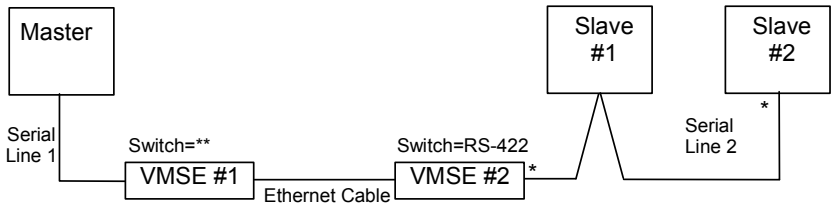
Figure 6-13. Wiring Diagram

Specifications

- D-Sub Connector: Male, 15-pin
- Cable: Shielded, twisted-pair rated for RS-485 use. Ground shield at one end only, as shown above.
- Maximum cable length: 1200 meters (4,000 feet)
- VMSE Switch setting: Set to RS-422 position (see Figures 6-2 and 6-3). Also, the "Interface Type" configuration parameter must be set to RS-422.

Using the VMSE on an RS-422/485 Multidrop Network

The following figure shows an acceptable configuration for a multidrop network. This example shows only two slave devices; if additional slaves were added, termination would be required at the last slave device instead of at Slave #2.



* Termination is required across RD or RX terminals at these locations if the serial line is greater than 6 feet (2 meters) long

** VMSE #1 must be set to the configuration (RS-232 or RS-422) that matches the Master

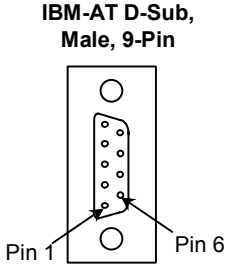
Figure 6-14. Using the VMSE in a Multidrop Arrangement

Multidrop Application Notes

- Any serial line longer than 6 feet (2 meters) must have a termination resistor across its receive terminals (RD or RX) at the end of each receive line.
- The serial port on the VMSE #2 screw terminals must be used since it is the only VMSE port that supports RS-422. The VMSE's RJ-45 Serial port cannot be used since it is an RS-232 port only, and RS-232 does not support multidrop.
- The switch on the front of the VMSE #2 must be set to RS-422 position to enable RS-422 on the VMSE screw terminals. Also, the "Interface Type" configuration parameter must be set to RS-422 (no other setting is acceptable).
- Serial Line 1 may be RS-232 or RS-422 as long as both Master and VMSE #1 are configured accordingly.
- For Serial Line 2, which must be an RS-422 line, match the specifications and basic wiring scheme for User-Built Cable #4. All multidrop connections must be made at the nodes inside the connectors (thus, each connector terminal would have two wires attached), in a parallel "daisy-chain" style. No line stubs or intermediate terminal blocks are permitted.
- Each serial cable's shield must be grounded at one end of the cable only.
- The VMSE can be the only device connected to the master on Serial Line 1 shown in Figure 6-14 above.

Serial Port Connectors

IBM-AT Style Personal Computer Serial Port Connector



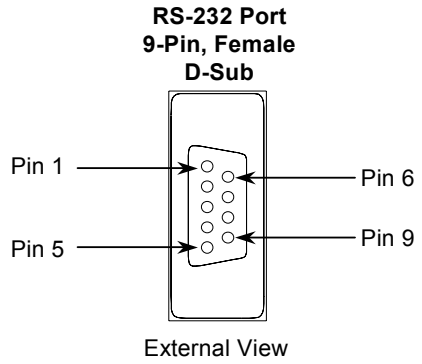
External View

Pin	*Signal*	*Description*
1	DCD	Data Carrier Detect
2	RD	Receive Data
3	TD	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	NC	No Connection
7	RTS	Request to Send
8	CTS	Clear to Send
9	NC	No Connection

Figure 6-15. IBM-AT 9-Pin Serial Port Connector

9-Pin, D-Sub PLC Serial Port Connector

This connector is used for an RS-232 serial port on VersaMax CPUs. For additional information on VersaMax serial ports, please refer to the *VersaMax PLC User's Manual*, GFK-1503.



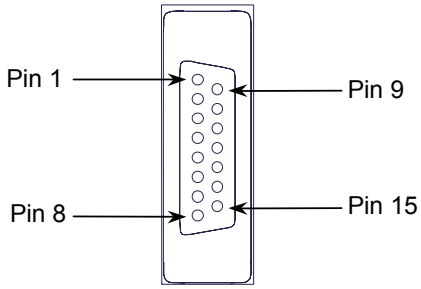
Pin-Out for 9-Pin D-Sub Serial Connector (RS-432)			
Pin	**Signal**	**Direction**	**Description**
1	N/C		No connection
2	TXD	Output	Transmit Data output
3	RXD	Input	Receive Data input
4	N/C		No connection
5	GND	--	0V/GND signal reference
6	N/C		No connection
7	CTS	Input	Clear to Send input
8	RTS	Output	Request to Send output
9	N/C		No connection
Shell	SHLD	--	Cable Shield wire connection

Figure 6-16. 9-Pin D-Sub Serial Port Connector

15-Pin, D-Sub PLC Serial Port Connector

This connector is used for an RS-485 serial port on all Series 90-30, Series 90-70, and VersaMax CPUs, and on some Nano/Micro PLCs. For information on Series 90 ports, refer to the *Series 90 PLC Serial Communications Manual,* GFK-0582. For VersaMax serial ports, refer to the *VersaMax PLC User's Manual*, GFK-1503. For VersaMax Nano/Micro ports, refer to the *VersaMax Micro PLCs and Nano PLCs User's Manual*, GFK-1645.

RS-485 Port 15-Pin,
Female D-Sub



External View

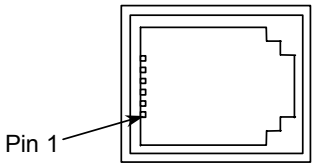
Pin-Out for 15-Pin D-Sub Serial Connector (RS-422/485)			
Pin	**Signal**	**Direction**	**Description**
1	SHLD	--	Cable Shield Drain wire connection
2, 3, 4	N/C		No connection
5	P5V	Output	+5.1VDC to power external devices
6	RTS (A)	Output	Request to Send (A) output
7	GND	--	0V/GND reference signal
8	CTS (B')	Input	Clear to Send (B) input
9	RT	--	Resistor Termination (120 ohm) for RDA'
10	RD (A')	Input	Receive Data (A) input
11	RD (B')	Input	Receive Data (B) input
12	SD (A)	Output	Transmit Data (A) output
13	SD (B)	Output	Transmit Data (B) output
14	RTS (B)	Output	Request to Send (B) output
15	CTS (A')	Input	Clear to Send (A) input
Shell	SHLD	--	Cable Shield wire connection

Figure 6-17. 15-Pin D-Sub Serial Port Connector

RJ-11 PLC Serial Port Connector

This connector is used for an RS-232 serial port on some Series 90-30 and Series 90-70 CPUs. For additional information on these ports, please refer to the *Series 90 PLC Serial Communications Manual,* GFK-0582.

RS-232, 6-Pin RJ-11



External View

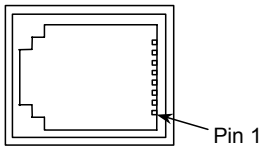
Pin	*Signal*	*Description*
1	CTS	Clear to Send
2	TXD	Transmit Data
3	0V	Signal Ground
4	0V	Signal Ground
5	RXD	Receive Data
6	RTS	Request to Send

Figure 6-18. RJ-11 Serial Port Connector

RJ-45 VersaMax Nano/Micro PLC Serial Port Connector

Port 1 on the VersaMax Nano and Micro PLCs is an RS-232 port with an 8-pin RJ-45 vertical jack. In addition to being a general serial communications port, this port is also used as the boot loader port for upgrading the PLC firmware on these PLCs. Note that the pin-out for this connector is different than that of the RJ-45 connector on the VMSE.

RS-232, 8-Pin RJ-45



External View

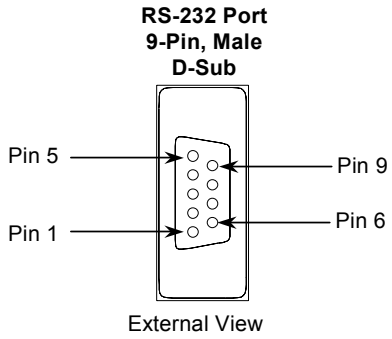
Note: There is no shield or frame-ground or shield pin on this connector.

Pin	*Signal*	*Direction*	*Description*
1	RTS	Output	Request to Send output
2	CTS	Input	Clear to Send input
3	RXD	Input	Receive Data input
4	TXD	Output	Transmit Data output
5	DCD	Input	Data Carrier Detect input
6	DTR	Output	Data Terminal Ready output
7	+5V	Output	+5VDC output to power external converters
8	GND	--	0V/Gnd signal reference

Figure 6-19. VersaMax Nano and Micro RJ-45 Serial Port Pin-Out

IC690ACC901 Miniconverter 9-Pin, Male D-Sub Connector

The RS-232 end of the IC690ACC901 Miniconverter has a 9-pin, male D-sub connector. Refer to the *Series 90-30 PLC Hardware and Installation Manual*, GFK-0356, for a data sheet on the IC690ACC901 Miniconverter.



Pin-Out for 9-Pin D-Sub Male Miniconverter Serial Connector (RS-432)			
Pin	**Signal**	**Direction**	**Function**
2	SD	Output	Send Data
3	RD	Input	Receive Data
5	GND	--	0V/GND signal reference
7	CTS	Input	Clear to Send
8	RTS	Output	Request to Send

Figure 6-20. IC690ACC901 Miniconverter RS-232 Connector Pin-Out

Chapter 7

Technical Data

CPU, Memory, and Controllers

- V.40 CPU, 10MHz clock
- National Semiconductor DP839xx Ethernet Controller
- 128 kByte RAM, 128 kByte Flash EPROM
- 256 Byte E²PROM for parameter storage

Serial Interface

- RJ-45 connector for RS232 interface
- Screw terminals for RS232 or RS422/485 interface
- Speed software selectable 300 to 38.4k baud
- Switch selectable RS-232C or RS-422/485 – screw terminal connector only

Network Interface

- Integrated 10BaseT port (RJ-45 connector)

Power Supply (not included)

- Screw terminals for 9-30 Volt DC input from external supply

Power Consumption

- Maximum 3 Watt

Operating Temperature

- 0-60 degrees C (32-140 degrees F)

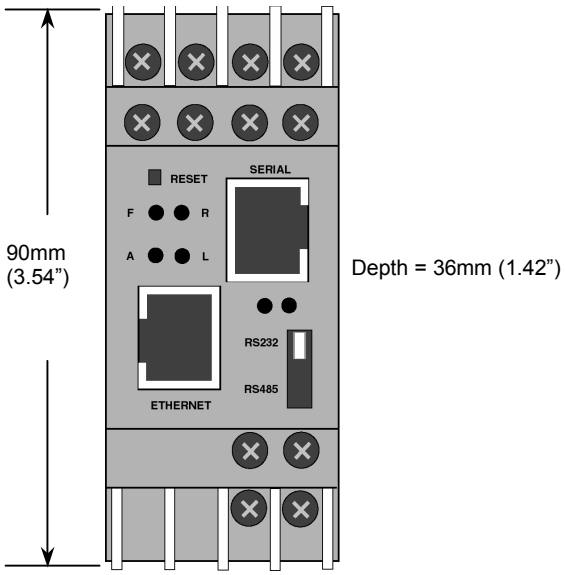
LEDs

- Four LEDs for Ethernet channel, link, activities, and error. See Chapter Six for details.
- Two LEDs for serial channel status.

Case

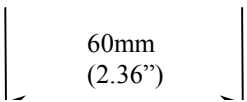
- Plastic case for DIN rail mounting

Dimensions



Weight

- Approx. 150g (0.33 lb)



Appendix A IP Addresses

IP Addressing

An IP address is a 32-bit value, divided into four octets of eight bits each. The standard representation is four decimal numbers (in the range of 0..255), divided by dots.

Example: 192.2.1.123

This is called dotted-decimal notation.

The IP address is divided in two parts: network and host. To support different needs, three ”network classes” have been defined. Depending on the network class, the last one, two or three bytes define the host, while the remaining part defines the network. In the following, ‘x’ stands for the host part of the IP address:

Class A Network

IP address 1.x.x.x to 127.x.x.x

Only 127 different networks of this class exist. These have a very large number of potential connected devices (up to 16,777,216)

Example: 10.0.0.1, (network 10, host 0.0.1)

Class B Network

IP address 128.0.x.x to 191.255.xxx.xxx

These networks are used for large company networks. Every network can consist of up to 65,534 devices.

Example: 172.1.3.2 (network 172.1, host 3.2)

Class C Network

IP address 192.0.0.xxx to 223.255.255.xxx

These network addresses are most common and are often used in small companies. These networks can consist of a maximum number of 254 hosts.

Example: 192.7.1.9 (network 192.7.1, host 9)

The remaining addresses 224.x.x.x - 239.x.x.x are defined as ”class D” and are used as a multicast addresses.

The addresses 240.x.x.x. - 254.x.x.x are defined as "class E" and are reserved addresses.

Network Address

The host address with all host bits set to "0" is used to address the network as a whole (in routing entries, for example).

Broadcast Address

The address with the host part bits set to ‘1” is the broadcast address, meaning “for every station”.

Network and Broadcast addresses must not be used as a host address (e.g. 192.168.0.0 identifies the entire network, 192.168.0.255 identifies the broadcast address).

IP Netmask

The netmask is used to divide the IP address differently from the standard defined by the classes A, B, C. A netmask defines how many bits from the IP address are to be taken as the network section and how many bits are to be taken as the host section. When the number of host bits is entered, the VMSE calculates the netmask. The netmask is displayed in standard decimal-dot notation.

	Network Bits	*Host Bits*	*Netmask*
Class A	8	24	255.0.0.0
Class B	16	16	255.255.0.0
Class C	24	8	255.255.255.0

Figure A-1. Standard IP Network Netmask

Netmask Examples

Netmask	*Host bits*
255.255.255.252	2
255.255.255.248	3
255.255.255.240	4
255.255.255.224	5
255.255.255.192	6
255.255.255.128	7
255.255.255.0	8
255.255.254.0	9
255.255.252.0	10
255.255.248.0	11
.	.
.	.
255.128.0.0	23
255.0.0.0	24

Figure A-2. Netmask Examples

Private IP Networks and the Internet

If your network is not connected to the Internet and there are no plans to make such a connection you may use any IP address you wish.

If you are not connected to the Internet and have plans to connect, or you are connected to the Internet and want to operate your VMSEs on an Intranet you should use one of the sub-networks below. These network numbers have been reserved for such networks. If you have any questions about IP assignment consult your Network Administrator.

Class A	10.x.x.x
Class B	172.16.x.x
Class C	192.168.0.x

Network RFC's

For more information regarding IP addressing see the following documents. These can be located on the World Wide Web using one of the directories or indices:

RFC 950	Internet Standard Subnetting Procedure
RFC 1700	Assigned Numbers
RFC 1117	Internet Numbers
RFC 1597	Address Allocation for Private Internets

Appendix B Binary to Hexadecimal Conversion Table

Hexadecimal digits have values from 0..15, represented as 0...9, A (for 10), B (for 11) ... F (for 15). Use the following table to convert binary-to-decimal-to-hex:

Decimal	Binary	Hexadecimal
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Figure B-1. Decimal, Binary, and Hexadecimal Conversion Table

To convert a binary value that has more than four bits, separate it into groups of four bits. (If the number of binary bits is not an even multiple of four, add leading zeroes to make it an even multiple.) Each group of four binary bits represents a single hexadecimal number. For example, let's convert the binary number 1011110000 to the hexadecimal number 2F0. First separate the binary number into groups of four bits (add two leading zeroes): 0010 1111 0000. Then use the above conversion table to find the hexadecimal value for each group: 0010 = 2, 1111 = F, 0000 = 0.

Appendix C Declaration of Conformity

Declaration of Conformity

according to ISO/IEC Guide 22 and BS 7514

The following product:

Product Name:	VMSE
Product Number(s):	IC200SET001

Conforms to the following standards or other normative documents:

Electromagnetic Emissions:	C1SPR22: 1993 Class “A”
	EN55022, 1995 Class "A"
Electromagnetic Immunity:	EN50082-1, 1992
Product Safety:	EN60950, 1988 +A1, A2, A3, A4

Supplementary Information:

This product has been verified as being compliant within the class A limits of the FCC Radio Frequency Devices Rules (FCC Part 15, Subpart B), revised as of October 1993.

"The product complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/E

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